Small Business Innovation Research/Small Business Tech Transfer

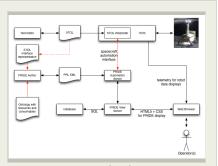
Integrating Standard Operating Procedures with Spacecraft Automation, Phase I



Completed Technology Project (2016 - 2016)

Project Introduction

Spacecraft automation has the potential to assist crew members and spacecraft operators in managing spacecraft systems during extended space missions. Automation can monitor critical resources, perform routine tasks, respond to unexpected events, and manage the overall operation of on-board systems. Current NASA missions to the International Space Station (ISS) are heavily dependent upon ground controllers to assist crew members in performing these activities. Crew members and ground controllers rely on predefined standard operating procedures, which are at the heart of spacecraft operations. In current operations, automation and procedures are completely divorced from each other. This can make it difficult to utilize fully spacecraft automation, especially in long-duration crewed missions when ground control support is limited. On-board spacecraft automation typically focuses on fault monitoring and response and often uses specialized programming or scripting environments that are not accessible to crew members or system experts. On the other hand, procedures focus on non-continuous, human-in-the-loop execution of high-level instructions to change spacecraft operating states or respond to operational failures. This means that spacecraft automation systems are ignorant of the higher-level procedures being performed around them and spacecraft automation systems cannot exchange data with these procedures. On the other hand, procedures do not have access to or authority over spacecraft automation software and little knowledge of resource status or demands. TRACLabs has developed a procedure integrated development environment called PRIDE that is currently being used by NASA for ISS and Orion procedures. TRACLabs proposes to develop a generic PRIDE interface to real-time spacecraft automation systems. We propose to prototype this interface using the Integrated Test and Operations System (ITOS) and its Spacecraft Test and Operations Language (STOL) interpreter.



Integrating standard operating procedures with spacecraft automation, Phase I

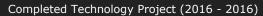
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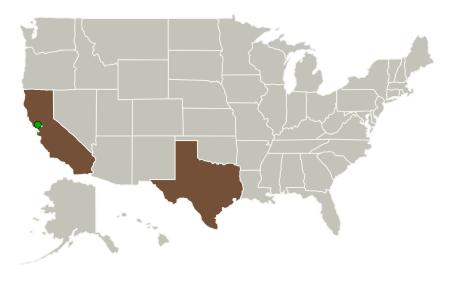
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Туре	Location
TRACLabs, Inc.	Lead Organization	Industry	Webster, Texas
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Texas

Project Transitions

June 2016: Project Start



December 2016: Closed out

Closeout Documentation:

• Final Summary Chart(https://techport.nasa.gov/file/139690)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

TRACLabs, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

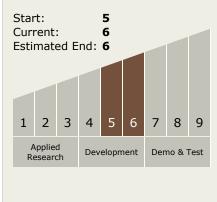
Program Manager:

Carlos Torrez

Principal Investigator:

David M Kortenkamp

Technology Maturity (TRL)





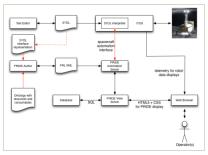
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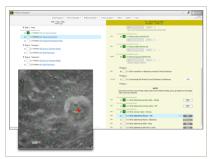
Completed Technology Project (2016 - 2016)

Images



Briefing Chart Image

Integrating standard operating procedures with spacecraft automation, Phase I (https://techport.nasa.gov/imag e/134122)



Final Summary Chart Image

Integrating standard operating procedures with spacecraft automation, Phase I Project Image (https://techport.nasa.gov/imag e/134908)

Technology Areas

Primary:

- TX10 Autonomous Systems
 - ☐ TX10.2 Reasoning and Acting
 - ☐ TX10.2.4 Execution and Control

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System

